Space Weather Forecast

Issued on Wednesday, 24 July 2024 at 01:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2/Minor-Moderate likely with a chance of G3/Strong Geomagnetic Storms 24 Jul. Chance of R1 Radio Blackouts throughout. Ongoing S1 Solar Radiation Storm easing by 25 Jul.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has remained Moderate, with a peak long period Moderate class flare observed at 23/1428 UTC, from the southeast limb. There are currently ten sunspot regions on the solar disc. The two prominent spots in the southwest are showing signs of decay. The long but sparsely populated spot in the southeast, has a complex trailing portion consisting of a delta. There are three spots in the far east of the disk, though none appear considerably large or complex at this viewing angle.

There were three coronal mass ejections observed in coronagraph imagery in the past 24 hours. The first was a full halo coronal mass ejection from the far-side of the Sun around 23/0030 UTC, which produced the current and on-going minor (S1) proton storm event. The second was observed at 23/0400 UTC off the southwest limb, associated with C3 flare, which has been analysed as a likely miss ahead of Earth arriving at 1AU on 26 Jul. The final coronal mass ejection was from the southwest limb, associated with the M2.4 flare near AR3764 at 23/1430 UTC. This gave a wide and moderately fast coronal mass ejection, perhaps with low confidence of glancing impacts at Earth possible on or around 26 Jul.

Solar Wind / Geomagnetic Activity: The solar wind was at mostly background conditions until a weak coronal mass ejection (thought to be from 19 Jul) arrived around 23/1950 UTC. Speeds remained slow throughout, but jumped at 23/1950 UTC. The interplanetary magnetic field was Weak, becoming Moderate to Strong after 23/1950 UTC. The important north-south component was almost entirely positive, especially after 23/1950 UTC where it peaked at Moderate. The net result of the above solar wind measures was for mostly Quiet (Kp 0-2) geomagnetic indices, with an Unsettled (Kp3) interval observed 23/1800-2100UTC.

Energetic Particles / Solar Radiation: Radiation levels reached S1/Minor Storm threshold and are still ongoing in response to the very large full halo CME from the far-side of the Sun early in the UTC day.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely throughout. While a particularly active sunspot region has now departed the facing side, its loss is in some way compensated for by the flaring into life of a second group in the southeast.

Solar Wind /Geomagnetic Activity: No coronal holes or their fast winds feature in the forecast period. Earth is currently experiencing a rather slow and weak coronal mass ejection. Two further coronal mass ejections are expected in the period. The first and most notable, is expected to arrive at Earth during day 1 (24 July), most likely during the first part of the day. Speeds may reach enhanced or strong, around 500-700 km/s during this event. The second was a wide a moderately fast coronal mass ejection, with low confidence of glancing impacts at Earth

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on or around 26 Jul.

Geomagnetic activity will likely become enhanced day 1 (24 Jul) with G1-G2/Minor-Moderate storms likely and a chance of G3/Strong storms. Geomagnetic activity should begin to wane into day 2 (25 Jul), with Quiet conditions likely. There is a slight chance of G1 Minor Storms should the CME from 23 Jul arrive on day 3 (26 Jul).

Energetic Particles / Solar Radiation: Current above threshold radiation storm levels (S1) should gradually decline to below storm levels by day 2 (25 July), with a Slight Chance of rising back above the S1/Minor Storm threshold in response to any notable flares.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	10	20	5
Strong	G3	No	30	1	1	1
Severe	G4	No	5	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	90	20	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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